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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,301	04/02/2001	Christopher A. Bode	2000.057800	9382

23720 7590 10/17/2003

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EXAMINER	
SHECHTMAN, SEAN P	

ART UNIT	PAPER NUMBER
2125	5

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/824,301	BODE ET AL.	
	Examiner	Art Unit	
	Sean P. Shechtman	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *04 August 2003* is: a)☐ approved b)☒ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Claims 1-45 are presented for examination. Claims 1-45 have been amended.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. See page 7, lines 13-20 of the instant specification.

Drawings

3. The specification has been amended to correct the previous drawing deficiencies, however, figure 2 has not been amended to consistently refer to a process controller as suggested by the page 2 of the amendment filed August 4th, 2003. Examiner respectfully suggests that figure 2 should be amended to consistently refer to a process controller.

Specification

4. Objections withdrawn due to the amendment.

Claim Objections

5. Objections withdrawn due to the amendment.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2, 6, 31, and 36 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2, 6, 31, and 36 are directed towards initializing the control model based on a control variable, however, claims 1 and 28 (from which claims 2, 6, 31, and 36 depend) are directed towards initializing the control model in response to receiving the tool event notification. Therefore, examiner respectfully asks, is the control model initialized based on a control variable or is the control model initialized in response to receiving the tool event notification?

Claim Rejections - 35 USC § 102

7. Rejections withdrawn due to the amendment.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 2, 6, 11, 17, 22, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,546,312 to Mozumder in view of U.S. Pub. No. 2002/0116083 to Schulze.

Referring to claims 1, 6, 11, 17, 22, 28 and 30, Mozumder teaches a method for initializing process controllers based on tool event data, comprising:

Providing a tool (Col. 4, lines 22-30) having a process controller adapted to employ a control model to control an operating recipe of the tool; receiving a tool event notification (Col.

1, lines 61-67); and tuning the control model in response to receiving the tool event notification (Col. 1, lines 46-57; Col. 6, lines 34-40; Col. 9, lines 18-24; Col. 7, lines 10-17);

Performing a qualification procedure on the tool in response to receiving the tool event notification to determine a control variable (Col. 1, lines 56-58; Col. 8, lines 18-28); and tuning the control model based on the control variable (Fig. 5, element 70; Col. 10, lines 5-8).

Mozumder teaches a system for fabricating semiconductor wafers (Col. 1, lines 29-46), comprising: a process controller with the feature of models and goals, wherein the goals are the functional outputs of the models (i.e., the goals are controlled by the models) (Col. 1, line 47; Col. 2, lines 44-55). At least one of the goals is to generate a process recipe (Col. 1, lines 46-57; Col. 6, lines 34-40; Col. 9, lines 18-24). The controller does this based on changes in the process and equipment state (Col. 1, lines 47-58; Col. 4, lines 31-36), wherein these changes are in response to events such as preventive maintenance (Col. 9, lines 25-28). Examiner respectfully notes that Mozumder directly attributes computing a new recipe in response to preventive maintenance (Col. 9, lines 25-28).

Applicant describes the qualification process as measurements on test wafers in page 2 of the amendment filed on August 4th, 2003. Mozumder teaches correcting equipment settings to bring product quality characteristics on target (Col. 1, lines 56-58), wherein these product quality characteristics are measurements from test wafers in response tool events (Col. 8, lines 18-28). This quality parameter is clearly a feedback control variable used to tune the models as seen in Fig. 5, element 70 and discussed in Col. 10, lines 5-8.

Referring to claims 2 and 31, Mozumder teaches the system above, wherein initializing the control model comprises:

Estimating a control variable value (Col. 3, lines 24-28; Col. 6, lines 34-47; Col. 7, lines 10-17); and initializing the control model based on the estimated control variable (Col. 3, lines 28-34; Col. 10, lines 39-46).

Referring to claims 1, 17, and 28, Mozumder teaches "adapting the models to the new state" based on the state changes (Col. 1, lines 61-67). Examiner respectfully submits that the model tuning based on equipment state changes is initializing a control model based on tool event notification. Furthermore, examiner respectfully submits that unacceptable tolerances requiring that the process control variables be repeatedly feedback to tune the models are initializing the control models based on a control variable (Fig. 5, element 70; Col. 10, lines 5-8). However, if "initializing" the models is not clear, then Schulze teaches analogous art, i.e., a semiconductor fabrication system for controlling the manufacture of wafers according to a recipe (Abstract; Page 21, claim 13 of Schulze), wherein,

Trigger/event messages are received from the fabrication tools for tracking operation states of the semiconductor fabrication tools (Page 21, claim 21 of Schulze), and "state models are updated for each tool affected" and the "transitions within the state models are recorded in a tracking database" (Abstract of Schulze). Examiner respectfully submits that the triggering of states for updating the state model of each tool is initializing a model in response to a tool event.

Moreover, Schulze teaches transitioning to a process qualification state in response to event/triggers (Page 6- Page 7, paragraph 0063 of Schulze), wherein the qualification state has a recipe (i.e., such as an equipment qualification recipe in Page 17, paragraph 0299 of Schulze) and the state transition of each state model is based on recipe classifications and trigger events

(Page 20, claim 5 of Schulze). Examiner respectfully submits that the recipe classification is a control variable because the next transition state "depends upon the recipe classification" (Page 13, paragraph 0194 of Schulze).

Referring to claim 29, Mozumder fails to reasonably provide for a server. However, Schulze teaches an automated monitoring and assessment system comprising of a server for controlling communications over the system bus (Page 4, paragraph 0040 – 0045 of Schulze).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the system of Mozumder to include the initializing model and server of Schulze.

One of ordinary skill in the art would have been motivated to combine these references because Schulze teaches a system for monitoring and assessing operation of a semiconductor fabrication facility for assessing overall equipment effectiveness and overall fabrication effectiveness (Page 3, paragraph 0016-0017 of Schulze).

9. Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,546,312 to Mozumder in view of U.S. Pub. No. 2002/0116083 to Schulze as applied to claims 28 and 29 above, and further in view of U.S. Pub. No. 2002/0147960 to Jevtic.

The combination of Mozumder and Schulze meet the limitations of claim 36 as described in the rejection of claims 6 and 17 above, however, referring to claim 35, if scheduling a qualification procedure on the tool is not clear, then Jevtic teaches scheduling for the periodic removal of wafers for testing (Page 1, paragraph 0005 of Jevtic).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the system of Mozumder to include the scheduling of Jevtic.

One of ordinary skill in the art would have been motivated to combine these references because Jevtic teaches computing an optimal schedule for moving wafers into defect control stations (Page 1, paragraph 0011 of Jevtic).

10. Claims 3-5, 7-10, 12-16, 18-21, 23-27, 32-34, and 37-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,546,312 to Mozumder in view of U.S. Pub. No. 2002/0116083 to Schulze or U.S. Pat. No. 5,546,312 to Mozumder in view of U.S. Pub. No. 2002/0116083 to Schulze in view of U.S. Pub. No. 2002/0147960 to Jevtic and further in view of "Semiconductor Manufacturing Technology" by Michael Quirk.

Referring to claims 3-5, 7-10, 12-16, 18-21, 23-27, 32-34, and 37-45, Mozumder teaches exercising SPC control that tunes the models using measured quality parameters from the products (Col. 3, lines 9-25 of Mozumder). Mozumder goes on to teach an example of this quality parameter as deposition rate (Col. 2, lines 10-16 of Mozumder) and etch rate (Col. 4, lines 8-30 of Mozumder).

Referring to claims 3-5, 7-10, 12-16, 18-21, 23-27, 32-34, and 37-45, Schulze teaches examples of fabrication processes include etching, deposition, diffusion, and cleaning (Page 1, paragraph 0005 of Schulze).

Although the references cited above fail to meet the limitations of every tool claimed in claims 3-5, 7-10, 12-16, 18-21, 23-27, 32-34, and 37-45, examiner submits that the disclosure of

the textbook "Semiconductor Manufacturing Technology" by Michael Quirk does meet the limitations of every tool claimed by applicant, and therefore having been written and published prior to applicant having applied for a patent, examiner asserts that such information was commonly known in the art.

The patentable invention is not the tool that the tool controller uses, therefore since Mozumder and Schulze teach only examples of tools used, it is inherent that said tool controller could use any of the tools described above or in the references cited as commonly known in the art.

Response to Arguments

11. Applicant's arguments with respect to claims 1-45 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents or publications are cited to further show the state of the art with respect to performing a qualification procedure on a wafer fabrication tool.

"Advanced Process Control Project at Infineon Technologies, Richmond", by Karzhavin (Page 12).

The following patents or publications are cited to further show the state of the art with respect to the baseline requirements for automatic data collection and use thereof in modeling tool states and determining control variables.

"Automatic Data Collection Baseline Requirements: Levels 1 and 2 Events and Variables", by Marsden (Pages 2 and 20).

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Shechtman whose telephone number is (703) 305-7798. The examiner can normally be reached on Monday-Friday from 9:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard, can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-9600.

SPS

Sean P. Shechtman

October 5, 2003

LEO PICARD
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